Background

Introduction
Radiation preparedness is no longer just a necessity for jurisdictions neighboring nuclear facilities. There is potential for radiation emergencies to occur anywhere in the country as result of an accidental radiological release, transportation accident, waste mismanagement, nuclear facility incident, or intentional terrorist attack. Moreover, there are readily available and often poorly protected radioactive materials in use throughout military, academic, research and industrial agencies.\(^1\) Once a radiation event occurs, there are likely to be large numbers of displaced persons traveling across jurisdictional lines to seek shelter and additional medical care in communities outside the affected area. While the probability of catastrophic radiation events such as an incident at a nuclear facility or a terrorist attack using a radiation dispersal device (RDD) or improvised nuclear device (IND) are relatively low, the consequences would be severe and could cause devastating impacts in the affected community. Due to the serious public health and national security threats brought by widespread radiation emergency, effective response requires coordination and participation of communities both near and far from nuclear facilities and other known sites where radioactive materials are utilized.

State and local health departments will have a critical role for ensuring the health of their jurisdiction’s population is protected during a radiation emergency, though health department functions and operational capacity may vary greatly from jurisdiction to jurisdiction. Responsibilities of state and local health departments may include ensuring shelters are stood up for displaced individuals, provision of radiation screening and decontamination services, administration of radiation surveillance and laboratory testing, disseminating health related public messaging, distributing available radiation medical countermeasures, and coordinating with healthcare providers to connect exposed or contaminated persons to follow-up care. To effectively meet the public health demands of radiation emergency, health departments will also rely upon response partners such as emergency management, law enforcement, environmental health, and healthcare providers both within their jurisdiction and outside their jurisdiction at all different levels of government to secure and coordinate response resources. In advance of an emergency, it is essential that all-hazards preparedness plans inclusive of a radiation response annex are developed, trained to, and exercised to ensure partner relationships are established and understood and response resources and capacities are known.

National partners such as the Radiation Injury Treatment Network (RITN) and the National Disaster Medical System (NDMS) provide preparedness information and resources in advance of event and can be utilized during an event to help meet some of the health and medical needs of a radiation emergency. "The Radiation Injury Treatment Network (RITN) is a group of voluntary hospitals focused on preparing to respond to a large scale radiological incident that results in casualties with acute radiation syndrome, that occurs distant to their location." As of July 18, 2016, there were total of 76 RITN centers across the United States, including five donor centers, six cord blood centers, and 65 transplant centers. During an emergency, RITN centers can support response efforts by accepting incident casualties, providing supportive care to those with radiation injuries, providing subject matter expertise to responders at other locations, and facilitating marrow transplants for a small percentage of individuals. In advance of an emergency, RITN offers basic radiation training to orient response agencies to the RITN concept of operations and conducts exercises on regular basis with jurisdictions across the nation to ensure they are familiar with how to utilize RITN resources during an emergency.

The National Disaster Medical System (NDMS) is a federally coordinated system that provides medical response capability support for state and local jurisdictions impacted by major disasters. NDMS may provide support by providing personnel, supplies, and equipment to an impacted area, assisting with the movement of patients from an impacted area, and/or by providing medical care at hospitals outside an impacted area. A portion of RITN hospitals are also designated as NDMS trauma centers and specialized care facilities. Within the context of radiation response, the NDMS trauma hospitals can be utilized to assist those with both traumatic injuries and combined injuries (trauma and radiation injuries) and can provide specialized medical care to certain patient groups (those with burns, pediatrics, etc.). In order to coordinate the follow-up care of impacted patients at response sites with RITN and NDMS locations, state and local health departments need to be aware of the services these entities provide and how to utilize these resources during a response. Training and outreach efforts need to occur to educate public health partners about these resources and how they can effectively coordinate with RITN partners to ensure the needs of their population are met during an emergency.

The first step is in this process is investigating what types of radiation preparedness activities state and local health departments are doing and how much they already know about both RITN and NDMS. In 2015, the National Association of County and City Health Officials (NACCHO) conducted a survey assessing radiation preparedness activities at local health departments within the 50 mile emergency planning zones of nuclear power plants across the United States. As radiation emergencies are not necessarily confined to jurisdictions with a certain radius of a nuclear power plant, the 2015 survey only captured a partial look at this important topic from health departments that are more likely to be doing radiation planning in the first place. This year, both NACCHO and the Association of State and Territorial Health Officials (ASTHO) are expanding the survey audience to all state and local health departments to learn more about preparedness efforts nationally.

**Project Scope**

This project focuses on state and local public health preparedness coordinators’ radiological emergency planning practices, their awareness of radiological/nuclear (RN) threats, and their familiarity with RITN and NDMS. The target audience for the survey was public health preparedness coordinators and radiation preparedness professionals from the 62 State, Territorial, and Directly Funded Cities health departments as well as from the 2,800 local health departments.

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2 RITN Overview Presentation. RITN website. Retrieved from: [http://www.ritn.net/about/](http://www.ritn.net/about/)

3 RITN Participating Centers Map. RITN website. Retrieved from: [http://www.ritn.net/about/](http://www.ritn.net/about/)
Project Goals
NACCHO and ASTHO, on behalf of the RITN, investigated public health preparedness coordinators’ level of awareness and practices through the administration of national surveys to their respective memberships to address the following research questions:
1) To what extent are preparedness coordinators across the country involved in preparedness planning activities for potential radiation emergencies?
2) What capabilities do public health preparedness coordinators possess nationally with respect to radiation preparedness?
3) What level of awareness and interaction do state and local public health preparedness coordinators have with RITN and NDMS?

Project Objectives
The objective of this project is to address areas for improvement in radiation emergency preparedness at state and local health departments across the United States:
1) Increasing the understanding of the preparedness coordinators’ awareness of radiation emergency concerns nationally;
2) Enhancing the understanding of the radiation emergency response capabilities of preparedness coordinators and available planning activities;
3) Expanding the level of awareness and interaction of preparedness coordinators with the RITN and NDMS.

Methodology

Survey Development
In coordination with RITN, NACCHO and ASTHO developed two separate surveys then aligned questions within their respective surveys to match whenever possible. The NACCHO Survey can be found in Appendix A and the ASTHO Survey can be found in Appendix B.

Survey Distribution
NACCHO directly sent their survey to their local preparedness coordinators list, radiation preparedness coordinators list, and the NACCHO Radiation Workgroup. The NACCHO survey was directly sent to a total of 1,492 unique emails. These emails represent the nation’s 2,800 local health departments and in some cases the one person represented more than one health department. The NACCHO survey was also disseminated through the International Association of Emergency Managers for additional promotion to encourage local health department preparedness coordinators to take the survey. Survey responses were collected from July 7, 2016 to August 5, 2016.

ASTHO sent the survey directly to state preparedness coordinators and also collected response information on five specific questions from participants via a webinar poll on the Directors of Public Health Preparedness call on July 12, 2016. ASTHO also additional promoted their survey through the Conference of Radiation Control Program Directors (CRCPD) and the National Emergency Management Association (NEMA) for further survey uptake.

Survey Analysis
Each organization independently summarized their respective data sets as there was some variation in some of the question wording and response options. Each question in the survey was summarized using
exported excel files and tables and figures were produced from summarized data. Maps were produced using participant zip codes and response information in ARCGIS version 10.4.

Results

Demographics

i. Response Rate

The first set of questions assessed the demographics of those who participated in the survey.

- NACCHO Responses:
  Of the 1,492 person that received the survey email, 465 (31%) opened the email. There were total of 281 survey participants. Of the 281 persons, there were 242 persons that fully completed the survey. Partial survey participant answers were included in the summary when possible. Because the survey was also promoted through partner organizations, there was a chance for participants not on the NACCHO direct mailing list to receive the survey.

- ASTHO Responses: ASTHO gathered information in two ways – through an online poll on a regularly scheduled Directors of Public Health Preparedness call, and via an online survey tool shared with the Conference of Radiation Control Program Directors and the National Emergency Management Association. Twenty-nine state preparedness directors participated in the poll during the call and 32 people completed the online survey.

Due to the indirect promotional activities via partner organizations, calculation of a response rate for both NACCHO and ASTHO survey participation was not possible.

ii. Map of Survey Responses

- NACCHO Responses:
  There were a total of nine states where the NACCHO survey did not have any participation including Alaska, Hawaii, North Dakota, Arkansas, Louisiana, Mississippi, South Carolina, and Rhode Island. The highest participation of survey takers was from Kansas, Illinois, and North Carolina. The number of responses per state for the NACCHO survey is shown in Figure 1.

![Figure 1. Map of NACCHO Survey Participation by State](image)
- ASTHO Responses:

Figure 2. Map of ASTHO Survey Participation by State

iii. Types of Organizations that Responded

- NACCHO Responses:
  The majority (88.7%) of those who participated in the survey represented local health departments. State public health departments were represented by 5.3% of participants, and 6.0% represented other organizations such as Medical Reserve Corps, private companies, and emergency management agencies.

Table 1. Types of organizations represented by NACCHO survey participants

<table>
<thead>
<tr>
<th>Organization Type</th>
<th>Number of Participants (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local/County Health Department</td>
<td>235 (88.7)</td>
</tr>
<tr>
<td>State Public Health Department</td>
<td>14 (5.3)</td>
</tr>
<tr>
<td>Other</td>
<td>16 (6.0)</td>
</tr>
</tbody>
</table>

- ASTHO Responses:
  The majority (90.2%) of survey and poll participants represented state public health preparedness departments. 9.8% of participants represented other types of public health departments such as local or environmental health.

Table 2. Types of organizations represented by ASTHO survey participants

<table>
<thead>
<tr>
<th>Organization Type</th>
<th>Number of Participants (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>State Public Health Department</td>
<td>55 (90.2)</td>
</tr>
<tr>
<td>Other Local or Environmental Health Department</td>
<td>6 (9.8)</td>
</tr>
</tbody>
</table>
iv. Position of Survey Responders

- NACCHO Responses:
  Preparedness Coordinators made up 40.8 percent of participants. Health Directors, Preparedness Directors, and Emergency Planners were also among those who participated in the survey.

<table>
<thead>
<tr>
<th>Title</th>
<th>Number of Participants (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparedness Director</td>
<td>42 (15.6)</td>
</tr>
<tr>
<td>Preparedness Coordinator</td>
<td>108 (40.8)</td>
</tr>
<tr>
<td>Health Director</td>
<td>66 (24.9)</td>
</tr>
<tr>
<td>Emergency Planner</td>
<td>23 (8.7)</td>
</tr>
<tr>
<td>Other</td>
<td>26 (9.8)</td>
</tr>
</tbody>
</table>

- ASTHO Responses:
  Preparedness Directors made up 47.5 percent of participants. Radiation Control Program Directors represented a significant portion of participants at 31.1%. The remaining participants identified as emergency preparedness planners or other unique roles such as Division Chief or Lead Inspector Incidents & Allegations.

<table>
<thead>
<tr>
<th>Title</th>
<th>Number of Participants (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparedness Director</td>
<td>29 (47.5)</td>
</tr>
<tr>
<td>Radiation Control Program Director</td>
<td>19 (31.1)</td>
</tr>
<tr>
<td>Emergency Planner</td>
<td>2 (3.3)</td>
</tr>
<tr>
<td>Other</td>
<td>12 (19.7)</td>
</tr>
</tbody>
</table>

Radiation Awareness and Planning Activities

i. Awareness and Description of Agencies Role

- NACCHO Response:
  About 67 percent of participants indicated that their agency/organization has a specific role in response to radiological emergencies. Individual roles include population monitoring, logistics, hazmat response, dosimetry, and radiological protection coordination.

- ASTHO Responses: ASTHO did not ask this question in their survey.

ii. Priority Given to Radiation

- NACCHO Response:
  Next, the priority given to radiation preparedness was assessed. Despite over half of participants indicating that their organization plays a specific role in radiological emergency response, just 13.4 percent of participants indicated radiological emergency planning as a high or very high priority.
iii. Awareness of Medical Evacuation

- ASTHO Responses: ASTHO did not ask this question in their survey.

- NACCHO Responses: NACCHO did not ask this question in their survey.

- ASTHO Responses:
  Survey participants were asked to rate their level of knowledge regarding medical evacuation following a radiation event. Most participants (65.5%) indicated that they are somewhat knowledgeable. Approximately 12.1% of participants said that they felt very knowledgeable about medical evacuation and 22.4 percent of participants said they were either not at all knowledgeable or not very knowledgeable.

Figure 3. Priority Given to Radiation among NACCHO Survey Respondents

Figure 4. Level of knowledge regarding medical evacuation following a radiation event from ASTHO survey participants (n=58)
iv. Plans in Place for Radiation Emergency

- NACCHO Responses:
  The most common plans set in place for a radiation emergency are medical countermeasure distribution and sheltering of evacuees. One result to note is 17.5 percent still have no plans for a radiological event. NACCHO survey participants with plans in place for RITN coordination were mapped in Figure 6. There were some states with multiple jurisdictions that have RITN coordination plans and other states where there were no participant responses for RITN plans. See Appendix C for a table of specific USAI city responses for which plans they have in place, priority given to radiation, and awareness of RITN.

Figure 5. NACCHO survey participants’ plans set in place for a radiation emergency

<table>
<thead>
<tr>
<th>Plan Type</th>
<th>Percentage of Jurisdictions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical countermeasure distribution</td>
<td>58.7%</td>
</tr>
<tr>
<td>Sheltering of evacuees</td>
<td>45.6%</td>
</tr>
<tr>
<td>Messaging templates</td>
<td>40.9%</td>
</tr>
<tr>
<td>Community reception centers</td>
<td>37.3%</td>
</tr>
<tr>
<td>Separate screening/decon from reception center</td>
<td>19.4%</td>
</tr>
<tr>
<td>Ingestion pathway</td>
<td>18.7%</td>
</tr>
<tr>
<td>Animal/pet decontamination</td>
<td>17.9%</td>
</tr>
<tr>
<td>Other</td>
<td>11.5%</td>
</tr>
<tr>
<td>RITN coordination</td>
<td>7.9%</td>
</tr>
<tr>
<td>None</td>
<td>17.5%</td>
</tr>
</tbody>
</table>

Figure 6. NACCHO survey participants’ radiation plans that include RITN
ASTHO Responses:
In the ASTHO survey, participants were asked to identify which types of radiation plans their jurisdiction had in place. A total of 54 participants responded and duplicate responses per jurisdiction were removed. The most common plans in place include sheltering of evacuees, community reception centers, and medical countermeasure distribution. On the following map, ASTHO displays the jurisdictions who reported having RITN Coordination integrated into their radiation emergency plans. In some instances, responses from the poll conflicted with responses received through the online survey tool. ASTHO believes these responses are helpful in showing a communications and planning gap among different departments within the same jurisdiction. In Illinois and New York specifically, the data could suggest a planning gap between state and local preparedness departments, highlighting the need for closer coordination and information sharing.
v. Radiation Training Topics

- NACCHO Responses:
Participants were asked to indicate which radiation capabilities were training conducted for in their jurisdiction in the last 24 months. Options included medical countermeasure distribution, ingestion pathway, community reception centers, animal/pet decontamination, sheltering of evacuees, and RITN training. Participants were also able to select “other” and type in a training type, other than those already listed. Almost 40 percent indicated training was provided for capabilities other than those listed. Among these “other” responses, general awareness was listed frequently.

- ASTHO Responses:

Participants were asked to indicate which radiation capabilities were training conducted for in their jurisdiction in the last 24 months. About 60 percent of survey participants indicated that in the last 24 months, training has been conducted for community reception centers, and about 53 percent indicated sheltering of evacuees training has been conducted. Participants were also able to write in answers categorized as “other”. These answers included “nuclear power plant response”, “large IND exercise”, “theft of GSR sources,” and “general dirty bomb tabletop”.

Figure 9. NACCHO survey participants’ trainings conducted in the past 24 months

Figure 10. ASTHO survey participants’ trainings conducted in the past 24 months
vi. Radiation Exercises

- NACCHO Responses:
  Participants were able to write in the date of the last radiological focused exercise in their jurisdiction. The most frequent answers were “unknown/don’t know” (32.2%) and “never” (23.4%). Approximately 24.6% of NACCHO survey participants had a radiation focused exercise in their jurisdiction within the past year.

![Figure 11. NACCHO survey participants' date of most recent radiological-focused exercise](image)

NACCHO survey participants were also asked about the scope of the last exercise in their jurisdiction. Options included tabletop, functional, and full-scale exercise, but 47 percent chose “not applicable”.

<table>
<thead>
<tr>
<th>Scope</th>
<th>Number of Participants (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tabletop Exercise</td>
<td>40 (16.5)</td>
</tr>
<tr>
<td>Functional Exercise</td>
<td>41 (16.9)</td>
</tr>
<tr>
<td>Full-Scale Exercise</td>
<td>47 (19.3)</td>
</tr>
<tr>
<td>Not Applicable</td>
<td>116 (47.3)</td>
</tr>
</tbody>
</table>

- ASTHO Responses:
ASTHO also asked an open-ended question about the date of the most recent radiological focused exercise in participants’ jurisdiction. The majority of participants indicated that their jurisdiction had conducted a radiological focused exercise within the last 6 months. One respondent reported that their jurisdiction had never conducted a radiation exercise. Although 48 jurisdictions responded to this question, 2 respondents did not give a valid date of the most recent exercise and were therefore excluded from the data presented in this figure.
Familiarity and Coordination with RITN and NDMS
Following demographics and planning activities, the survey assessed how aware participants are of the National Disaster Medical System (NDMS), and the Radiation Injury Treatment Network (RITN). Below is a table that summarizes the NACCHO responses for each of the survey questions that address RITN and NDMS.

Table 6. Familiarity with RITN and NDMS among NACCHO Survey Respondents

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes (%)</th>
<th>No (%)</th>
<th>Don’t Know (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is there a RITN center in your jurisdiction?</td>
<td>18 (35.3)</td>
<td>16 (31.4)</td>
<td>17 (33.3)</td>
</tr>
<tr>
<td>Are you familiar with NDMS?</td>
<td>166 (65.4)</td>
<td>88 (34.7)</td>
<td>n/a</td>
</tr>
<tr>
<td>Are you aware of the RITN?</td>
<td>84 (33.1)</td>
<td>170 (66.9)</td>
<td>n/a</td>
</tr>
<tr>
<td>Do you understand the capabilities RITN provides?</td>
<td>48 (18.9)</td>
<td>206 (81.1)</td>
<td>n/a</td>
</tr>
<tr>
<td>Is there a RITN Center in your jurisdiction?</td>
<td>21 (8.5)</td>
<td>78 (31.5)</td>
<td>149 (60.1)</td>
</tr>
</tbody>
</table>

i. Familiarity with RITN
ASTHO created a map that displays both ASTHO and NACCHO data reflecting participants’ familiarity with RITN. ASTHO participants could respond to the question on a four-point scale and NACCHO participants were provided a yes/no option for the same question. The map displays this information in a combined format with dots representing yes/no responses and various color shading representing the Likert Scale approach.
Figure 13. Familiarity of RITN and State and Local Health Departments

- NACCHO Responses:
  Only about 84 participants (33.1%) were familiar with the RITN. Of that amount, 48 participants (18.9%) understood the capabilities RITN provides.

Figure 14. NACCHO survey participants' level of familiarity with the RITN. (n=254)
ASTHO Responses:
Just over half (53.3%) of participants reported that they were somewhat familiar or very familiar with RITN. The other half felt that they were not at all or not very familiar with RITN.

Figure 15. ASTHO survey participants' level of familiarity with the Radiation Injury Treatment Network (n=60)

<table>
<thead>
<tr>
<th>Level of Familiarity with the RITN</th>
<th>Percentage of participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not at all familiar</td>
<td>21.6%</td>
</tr>
<tr>
<td>Not very familiar</td>
<td>25%</td>
</tr>
<tr>
<td>Somewhat familiar</td>
<td>43.3%</td>
</tr>
<tr>
<td>Very familiar</td>
<td>10%</td>
</tr>
</tbody>
</table>

ii. RITN Center in Jurisdiction
- NACCHO Responses:
  While 8.5 percent indicated that there is a RITN center in their jurisdiction, 31.5 percent indicated that there isn’t a RITN center in their jurisdiction, and 60.1 percent were not sure.

- ASTHO Responses:
  Approximately 35.5 percent of survey participants indicated that there is a RITN center in their jurisdiction, 20 percent said there was not, and a large number of participants (56.7%) responded that they didn’t know.

ASTHO reviewed state data from both surveys to validate whether participants were able to correctly identify RITN centers in their states. Half of the participants were able to correctly answer the question, “Is there a RITN Center in your jurisdiction?” Seven people incorrectly answered. Twenty-six participants said they did not know. Interestingly, of those, 19 people have a RITN Center in their state. Only seven do not.

Table 7. ASTHO survey participants' RITN Center identification

<table>
<thead>
<tr>
<th>RITN Center Identification</th>
<th>Number (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Correctly Identified</td>
<td>32 (49.2)</td>
</tr>
<tr>
<td>Incorrectly Identified</td>
<td>7 (10.8)</td>
</tr>
<tr>
<td>Did Not Know (Total)</td>
<td>26 (40.0)</td>
</tr>
<tr>
<td>Did Not Know (RITN Center in their state)</td>
<td>19 (29.2)</td>
</tr>
<tr>
<td>Did Not Know (RITN Center not in their state)</td>
<td>7 (10.8)</td>
</tr>
</tbody>
</table>
iii. RITN Exercise Participation

- NACCHO Responses:
  Of the fifteen (6.1%) survey participants who have participated in a RITN exercise, 8 participants indicated that it was a tabletop exercise. Four participants had participated in a functional exercise, and just 2 people had participated in a full-scale exercise.

- ASTHO Responses:
  Approximately 87.9 percent of survey participants said they have not participated in a RITN exercise. Of the 12.1 percent who confirmed that they have, 4 people participated in a tabletop exercise, and one person participated in a functional exercise.

iv. Familiarity with NDMS

- NACCHO Responses:
  The majority (65.4%) of NACCHO survey participants were familiar with NDMS.

- ASTHO Responses: ASTHO did not include this question in their survey.

v. NDMS Exercise Participation

- NACCHO Responses:
  About 83 percent of NACCHO survey participants said they had never participated in a NDMS exercise.

Figure 16. Map of RITN exercise participants
ASTHO Responses:
Approximately 90.9% of participants responded that they had never participated in an NDMS exercise. Of the 9.1% who confirmed that they had participated in and NDMS exercise, 2 participated in a tabletop exercise, 2 in a functional exercise, and one in a full-scale exercise.

Summary

Radiation preparedness is an issue that needs expanded attention by many more state and local health departments. There are a broad range of possible radiological events which may occur and these events may not be confined to just areas which fall within a certain proximity to a nuclear power plant. Additionally, displaced persons may travel across jurisdiction lines to communities far from an event, so it is essential that all jurisdictions have plans in place to manage those with possible radiation exposure and contamination. Building on the survey work that was done previously at NACCHO, these two additional surveys take an expanded look at nationwide radiation preparedness efforts and the level of awareness of RITN and NDMS at both state and local health departments.

These surveys reached a wide range of preparedness and radiation planners at state and local health departments across the United States. The majority (88.7%) of the NACCHO survey participants were from local health departments while the majority (90.3%) of ASTHO survey participants were from state health departments. Approximately 1/3 of NACCHO survey participants indicated that their agency did not have a specific role in radiation emergencies and 86.6% of NACCHO survey participants indicated that radiation preparedness was not a high priority. This 86.6% value is higher than the 2015 NACCHO survey and was expected as jurisdictions outside of 50-mile emergency planning zones (EPZs) were also included in the 2016 NACCHO survey (as opposed to 2015 survey where they were not included). These jurisdictions outside 50-mile EPZs are far less likely to be included in nuclear power plant exercises/drills and do not receive additional Radiological Emergency Preparedness (REP) Program funding.

Based on the ASTHO Survey there is generally a very broad knowledge of medical evacuation at the state health department level but there are still some gaps in terms of depth of knowledge with some health departments having no knowledge of medical evacuation. In terms of elements included in health department radiation preparedness plans, the NACCHO survey participants (i.e. local health departments) varied slightly from the top ranked items from the ASTHO survey participants (i.e. state health departments). Shelter Planning, Community Reception Center Planning, MCM distribution, and messaging templates were all among the most common items included for both survey groups. Across all radiation planning topics, NACCHO participants were less likely than ASTHO participants to include similar topics in their plans, which may suggest that state radiation preparedness planning efforts are generally more robust than at the local level. There is low inclusion of RITN in radiation preparedness plans at both the state and local level suggesting more outreach is needed at both levels to ensure they build this resource into their planning.

Compared to last year’s survey group, the 2016 NACCHO survey participants had very similar percentages and rankings of planning elements included in their plans compared to those within 50 mile emergency planning zones. The exceptions being that the 2016 group was more likely to have messaging templates, less likely to have a community reception center plan, and less likely to have a radiation plan in place at all (17.5% in 2016 compared to 13.0% in 2015).
For radiation preparedness training, NACCHO participants were far less likely than state health departments to provide trainings on a number of topics including community reception centers, sheltering of evacuees, and ingestion pathways. Similar percentages were observed from both groups for trainings on MCM distribution and animal/pet decontamination. Almost 40% of NACCHO participants indicated that their trainings did not include the listed radiation preparedness topics while that number was much lower for ASTHO participants (3.3%). These results suggest that local health departments are less likely to conduct radiation training in general than state health departments. None of the training topics were above 60% in either survey suggesting that there are still gaps nationally in terms of regularly conducting radiation training at both the state and local levels.

For radiation preparedness exercises, NACCHO survey participants were less likely to have a radiological focused exercise in their jurisdictions in the past year compared to ASTHO survey participants (24.6% versus 85.3%, respectively). Additionally, almost a quarter (23.4%) of NACCHO survey participants never had a radiological exercise in their jurisdiction while only 3.4% of ASTHO survey participants never had a radiological exercise. Because the jurisdictions of state health departments typically include all local health departments within their state, it is far more likely for states to be reporting exercises. With the majority (55.7%) of NACCHO participants either not having had a radiological exercise in their jurisdiction or not being sure about whether an exercise occurred, more needs to be done at the local level to encourage local health departments to conduct and participate in radiological exercises in their jurisdictions to ensure the plans they develop are adequate to respond to radiological emergencies.

Based on the NACCHO survey, there are large gaps at the local health department level on awareness of the RITN and inclusion of local health departments in RITN exercises. Only 1/3 of the NACCHO survey participants were familiar with the RITN and almost all NACCHO survey participants (94%) had never participated in a RITN exercise. These results suggest more outreach is needed to raise awareness of what RITN is at the local level but also to include and engage local health departments in RITN exercises. At the state level, the majority (53.3%) of ASTHO survey respondents indicated they were at least somewhat familiar with the RITN but the majority of ASTHO survey respondents (87.9%) indicated that they had never participated in a RITN exercise.

The majority of NACCHO survey participants (65.4%) were familiar with NDMS and 17% had participated in NDMS exercises. This higher familiarity may be due to the fact that NDMS may be utilized for a variety of different kinds of emergencies or their promoted through various meetings with federal, state, and local public health, healthcare, and emergency management colleagues. Interestingly, the level of state participation in NDMS exercises was lower, with just 9.1% of ASTHO survey participants saying that they had previously participated in an NDMS exercise.

These survey findings highlight that there are still many gaps in radiation preparedness planning and spotty awareness of available resources at both the state and local health department levels. The major challenges to overcome are the lack of funding, resources, and time that health departments have available to address the broad range of potential emergencies that might occur as well as the disparate flow of information on relevant resources down to the state and local levels. Jurisdictions not close to nuclear facilities will generally not rank radiation preparedness as a high threat in risk assessments and are likely to focus on threats that seem more likely or on activities that are required as part of their grant funding. If health departments begin to increase the level of incorporation of radiation preparedness into their activities that help them build all-hazards preparedness or activities that meet their grant requirements, then over time the level of radiation preparedness capacity we have as a nation will increase.
Recommendations

Based on survey findings and analysis conducted by ASTHO and NACCHO, the following action steps are recommended:

1. Create a year-long outreach campaign that relies heavily on groups such as the National Alliance for Radiation Readiness (NARR), NACCHO, and ASTHO to increase overall awareness of RITN. The campaign would:
   a. Include a formal outreach plan, including stakeholders and audience information, methods, timeline, and specific action items for each stakeholder.
   b. Utilize informational webinars and conference presentations to reach as many state and local preparedness coordinators as possible.
   c. Target specific states and groups of people based on the survey data shared in this report.
   d. Plan as many in-person meetings including state and local health departments as the annual budget will allow to increase face-to-face discussion about RITN, reinforcing relationships and the importance of including RITN in radiation plans.
   e. Begin with the states who show the largest knowledge gaps shared above.
2. Work to increase cross-collaboration and information sharing within health department and jurisdictions to reduce information silos and contradictory knowledge. We found that in some jurisdictions, people from the same state or locality gave conflicting responses about radiation emergency plans or exercises. This suggests inconsistent information sharing within health departments and likely means that the right people are not regularly included in planning efforts.
   a. Invite as many people as possible from one single jurisdiction to a webinar or meeting and encourage health departments to share information widely.
3. Continue to develop easily-accessed trainings via webinar (i.e. the Patient Movement webinar held in September 2016) on topics of interest, or those topics with proven knowledge gaps shared in the report above.
   a. Record the webinars and encourage broad sharing of information and resources.
4. Reinvigorate RITN’s and NDMS’ inclusion of state and local health departments in their exercises.
   a. Explore and refine the role of state and local public health in future RITN and NDMS exercises.
   b. Encourage participating healthcare partners to engage public health partners in their RITN and NDMS radiation exercises and encourage state health department participants to engage local health departments in their radiation exercises.

Acknowledgements

This document was made possible through support from the Radiation Injury Treatment Network. NACCHO and ASTHO are grateful for this support and would like to thank Cullen Case, CEM, CHEP, Senior Manager for Emergency Preparedness at the National Marrow Donor Program and Program Manager for the Radiation Injury Treatment Network who has been a leader in partnership building. This report was written by NACCHO staff members Raymond Puerini, MPH and Tiara Smith and ASTHO staff member Heather Misner, MPP. The views expressed within do not necessarily represent those of the sponsor.
Appendix A: NACCHO Survey Questions

Introduction
A radiation emergency may result from the detonation of an Improvised Nuclear Device (IND), the detonation of a Radiological Dispersal Device (RDD), or a radiological release at a commercial Nuclear Power Plant (NPP); to name a few scenarios. Such incidents may occur in the context of government-owned or -licensed facilities, privately owned property, urban centers, or other areas, and may impact people and infrastructure in the areas surrounding the immediate impact zone. The type of incident will define response operations and urgency. An IND will result in mass casualties, high levels of radiation, widespread structural and infrastructural damage, and displacement of people. A RDD will produce a wide range of possible consequences depending on the type and quantity of radioactive material used in the device, and the dispersal method employed. The effect of a RDD can range from a small (e.g., a street, single building, or city block), localized contamination area to a large, widespread contamination area spanning several square miles. For a NPP incident, in most cases, it is assumed that there will be days of warning prior to a nuclear power plant emergency resulting in a General Emergency impacting communities outside the facility grounds, which permits a more methodical preparation for the event. In the event of a catastrophic radiation emergency, it is likely that the incident will impact a large population both in the immediate vicinity and far beyond. Such an event will result in potentially thousands of casualties seeking assistance, overwhelming emergency response and public health operations. In order to improve the readiness stance of our nation, The Radiation Injury Treatment Network (RITN) in partnership with the National Association of County and City Health Officials (NACCHO) are interested in better understanding how jurisdictions are preparing for radiological emergencies.

Please complete the survey below by August 5, 2016. The survey will take about 10-15 minutes to complete. Anyone who completes the survey will be eligible to participate in a raffle for an iPAD Air.

Q1 What best describes your position?
- Preparedness Director
- Preparedness Coordinator
- Health Director
- Emergency Planner
- Other (please specify) ____________________

Q2 What best describes your organization?
- Local/county Health Department
- State Public Health Department
- Other (please specify) ____________________

Q3 Do you represent a location within the US?
- Yes
- No
Q4 What is your work zip code?
Q5 Does your agency/organization have a specific role in response to a radiological emergency?
  ○ Yes
  ○ No
  ○ Not Sure

Answer If Does your agency/organization have a specific role in response to a radiological emergency? If Yes Is Selected answer Q6.

Q6 Please explain your role in your organization's radiological emergency response.

Q7 How much of a priority is given to planning for radiological emergencies?

<table>
<thead>
<tr>
<th>Priority Level</th>
<th>Very Low or None</th>
<th>Low or Minor</th>
<th>Moderate or Significant</th>
<th>High</th>
<th>Very High</th>
</tr>
</thead>
</table>

Q8 What plans do you have in place for a radiation emergency? (check all that apply)
  ○ Medical Countermeasures distribution
  ○ Messaging Templates
  ○ Ingestion Pathway
  ○ Community Reception Centers
  ○ Animal/Pet Decontamination
  ○ Sheltering of Evacuees
  ○ Radiation Injury Treatment Network (RITN) Coordination
  ○ Separate Screening and Decontamination from Community Reception Centers
  ○ Other (please specify) ____________________
  ○ None

Q9 Are you familiar with the National Disaster Medical System?
  ○ Yes
  ○ No

Q10 Are you aware of the Radiation Injury Treatment Network (RITN)?
  ○ Yes
  ○ No

Q11 Do you understand what capabilities RITN provides?
  ○ Yes
  ○ No

If No Is Selected, Then Skip To Q13 “Is there a Radiation Injury Treatment...”
Q12 What hazards in your radiation response plan will be addressed with RITN incorporated as a response partner? Select all that apply.
- Local RDD (Radiological Dispersal Devices)
- Local RED (Radiological Emitting Device)
- Local IND (Improvised Nuclear Device)
- Local NPP (Nuclear Power Plant)
- Distant Radiological Disaster
- None of the above

Q13 Is there a Radiation Injury Treatment Network Center in your jurisdiction?
- Yes
- No
- Not sure

Q14 Which of the following radiation capabilities was training conducted for in your jurisdiction in the last 24 months? (check all that apply)
- Medical Countermeasure Distribution
- Ingestion Pathway
- Community Reception Centers
- Animal/Pet Decontamination
- Sheltering of Evacuees
- RITN Training
- Other ____________________
- None of the above

Q15 When was the last radiological focused exercise in your jurisdiction?

Q16 What was the scope of the exercise?
- Tabletop Exercise
- Functional Exercise
- Full-Scale Exercise
- Not Applicable

Q17 Have you participated in a National Disaster Medical System exercise?
- Yes
- No

Q18 Have you participated in a Radiation Injury Treatment Network (RITN) exercise?
- Yes
- No

If No Is Selected, Then Skip To Q20 “If you are interested in entering a r...”
Q19 What type of exercise(s) were the RITN exercise(s) that you participated in? Select all that apply.
- Tabletop Exercise (TTX)
- Functional Exercise (FE)
- Full-Scale Exercise (FSE)

Q20 Please indicate if you are interested in entering a raffle for an iPad Air.
- Yes
- No

Answer If Please indicate if you are interested in entering a raffle for an iPad Air. Yes Is Selected

Q21 To enter the raffle, please provide your name, email, and phone number.
   - Name
   - Email
   - Phone

Q22 By clicking the forward arrow, your responses will be submitted.
Appendix B: ASTHO Survey Questions

Radiation Injury Treatment Network Poll

ASTHO is conducting this survey to assess familiarity with and use of the Radiation Injury Treatment Network (RITN) among preparedness and emergency management staff in states and directly-funded cities. The results of this survey will be used to demonstrate the current level of familiarity with RITN across the country and to inform future technical assistance efforts. This survey will take approximately 5 minutes to complete. Questions may be directed to Heather Misner, Director of Preparedness and Clinical Outreach (hmisner@astho.org). Thank you in advance for your time!

1. In which jurisdiction do you work?
   [Dropdown to include states + directly-funded cities]

1a. What is the zip code of your organization?
   __________________

2. Which of these best describes your organization?
   - State or local health agency
   - Other state or local agency, please specify: __________________
   - Other, please specify: __________________

3. What is your position?
   - Director of Public Health Preparedness or equivalent
   - State/City Radiation Control Program Director or equivalent
   - State/City Emergency Manager or equivalent
   - Other, please specify: __________________

4. Please rate your level of knowledge regarding medical evacuation following a radiation event.
   - Not at all knowledgeable
   - Not very knowledgeable
   - Somewhat knowledgeable
   - Very knowledgeable

5. Please rate your level of familiarity with the Radiation Injury Treatment Network (RITN).
   - Not at all familiar
   - Not very familiar
   - Somewhat familiar
   - Very familiar

6. Is there a Radiological Injury Treatment Network center in your jurisdiction?
   - Yes
   - No
   - Don’t know

7. For which of the following does your agency or jurisdiction have in place a plan for a radiation emergency? (Please select all that apply.)
   - [ ] Medical Countermeasure Distribution
   - [ ] Messaging Templates
   - [ ] Ingestion Pathway
8. For which of the following capabilities was training conducted in your jurisdiction in the last 24 months? (Please select all that apply.)
   - Medical Countermeasure Distribution
   - Ingestion Pathway
   - Community Reception Centers
   - Animal/Pet Decontamination
   - Sheltering of Evacuees
   - Radiation Injury Treatment Network (RITN) Coordination
   - Separate Screening and Decontamination from Community Reception Centers
   - Other, please specify: __________________
   - None
   - Don’t know

9. When did the most recent radiological-focused exercise in your jurisdiction take place?
   - Month + Year: ________________
   - Never
   - Don’t know

10. Please describe the scope of the exercise.

11. Have you participated in a National Disaster Medical System (NDMS) exercise?
   - Yes
   - No

   [Display if answered “Yes” to 11.]
   11a. In what type of National Disaster Medical System (NDMS) exercise(s) have you participated? (Please select all that apply.)
      - Tabletop Exercise (TTX)
      - Functional Exercise (FE)
      - Full-Scale Exercise (FSE)

12. Have you participated in a Radiation Injury Treatment Network (RITN) exercise?
   - Yes
   - No

   [Display if answered “Yes” to 12.]
   12a. In what type of Radiation Injury Treatment Network (RITN) exercise(s) have you participated? (Please select all that apply.)
      - Tabletop Exercise (TTX)
      - Functional Exercise (FE)
• Full-Scale Exercise (FSE)

Thank you for taking the time to complete this survey!

Thank you for taking the time to complete this survey!
Appendix C: Urban Security Initiative Area City Radiation Preparedness

Below is a table which lists the radiation priority level, radiation plans in place, and whether or not the respondent was aware of RITN. Please note that the Twin Cities had six different responses and all response information has been merged into a single row.

<table>
<thead>
<tr>
<th>UASI City</th>
<th>Radiation Priority level</th>
<th>Plans in place</th>
<th>Other</th>
<th>RITN Awareness</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>MCM Distribution</td>
<td>Messaging Templates</td>
<td>Ingestion Pathways</td>
</tr>
<tr>
<td>Phoenix</td>
<td>No Info</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anaheim/ Santa Ana</td>
<td>No Info</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bay Area</td>
<td>Low or Minor</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Los Angeles /Long Beach</td>
<td>Moderate or Significant</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Riverside Area</td>
<td>No Info</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sacramento</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>San Diego</td>
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<td></td>
</tr>
<tr>
<td>Denver</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>National Capitol Region</td>
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<td>Tampa Area</td>
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<tr>
<td>Detroit</td>
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<tr>
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<td></td>
<td>X</td>
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<tr>
<td>City</td>
<td>Information</td>
<td>Environmental Monitoring</td>
<td>Yes/No</td>
<td></td>
</tr>
<tr>
<td>----------------------</td>
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<tr>
<td>St. Louis</td>
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<td></td>
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<tr>
<td>Cleveland</td>
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<td>Environmental Monitoring</td>
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<tr>
<td>Portland</td>
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<td></td>
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<tr>
<td>Philadelphia</td>
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<td></td>
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</tr>
<tr>
<td>Dallas/ Arlington/ Fort Worth</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pittsburgh</td>
<td>Low or Minor</td>
<td>Environmental Monitoring</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Seattle</td>
<td>Very Low or None</td>
<td>X</td>
<td>X</td>
<td>Yes</td>
</tr>
<tr>
<td>Houston</td>
<td>Moderate or Significant</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>
Appendix D: State’s Overall Radiation Preparedness Heat Score

Based on the online survey responses only (n=32), ASTHO created a heat scoring system to reflect participants’ overall radiation preparedness awareness. One point was awarded for each “yes” response in relation to plans in place, exercise conducted (on a sliding scale according to time since last exercise), and awareness of resources available (NDMS, RITN, etc). The heat map above reflects the results of the scoring system.

Since results are subjective based on who responded from each state, and do not reflect collective health department responses, the map should not be used as a measure of actual radiation preparedness.